An IoT Based Smart Surveillance Robot

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Abstract- *In day-to-day advancement of technology, robotics has become a promising field in many areas. Military uses robots to reduce the risk of our soldier's lives. Generally, security is a very important crisis for every department all over the world. Security has become a major issue in the evolution of technologies. It leads to major issues if these securities are vulnerable in sectors like militaries. At the same time, soldiers spying at the borders and camps face many risks involving their lives. Hence, the main goal of this paper is to design and develop a surveillance robot that can reduce the casualties in the war field and in the camps. The robot acts as surveillance device to capture the surrounding information and streams it over the internet. The control of movement of the robot is done by using IoT technology. The robot movement can be controlled by using an android phone. This project comprises of an IP night vision camera for live video streaming, Metal detectors for the detection of landmines, PIR Sensors and GPS Technology. This project aims to reduce the loss of life and achieve safety in the war field.*

Keywords- IoT, Robotics, Arduino, Military Purpose, Sensors

I. INTRODUCTION

Nowadays robotics plays an important role in our lives by reducing the workload with a better efficiency. They are widely used in industries to reduce the errors made by humans. Also, robotics is being used in defense department for surveillance to reduce the risk of human lives. Surveillance robots are used to monitor the behavior and suspicious activities of the environment.

The robot is controlled remotely by an android phone or a pc by using Internet of Things technology with the help of an IP camera for the vision. The camera vision is live streamed over the internet for monitoring purposes. A PIR sensor is used in this project for the detection of human movement. The robot stops moving and starts recording when it detects human activities using the PIR sensor. The metal detector placed on this robot is used to detect landmines buried under the ground in war fields. The GPS technology provides the exact location of the landmine to the user over the internet.

Section II: To describe the Objective of the project, Section III: Literature survey of the project, Section IV: Methodology of the project. Section V: Components used in this project. Section VI: Advantages of the project. Section VII: Verification and Results, Section VIII: Conclusion and Future Scope and Section IX: References.

II. OBJECTIVE

The main objective of this project is to design and implement automotive controller robots in the camps and in the military borders for the surveillance purpose. This robot can also be used in the war fields by implementing some technologies to save the lives of soldiers who serve our country on risk of their lives.

III. LITERATURE SURVEY

AhsanulHoque,Md. Baijid Hasan Shorif, ShekhNuruzzaman, Md. EftekharAlam designed aArduino Based Battlefield Assistive Robot, In this paper it is reported that a design of robot with an night vision camera which provides the live stream of the required vicinity and a metal detector is used to detect bombs beneath the robot.The IP camera used in their work do not provide the communication.
Jignesh Patoliya, Haard Mehta, Hitesh Patel designed aArduino Controlled War Field Spy Robot Using Night Vision Wireless Camera And Android Application, The authors designed a war field spy robot using night vision wireless camera. The movement of the robot is controlled using Bluetooth technology by an android application. The limitation of their work was the short range of communication of the robot vehicle.

P.Raja, Swapnil Bagwari designed AnIot Based Military Assistance And Surveillance, In this paper IoT Based Military assistance and surveillance system on wearable is presented. This system is implemented to find an effective solution for the problems faced by soldiers System MASS is a wearable specially designed for soldiers which helps them on the battlefield once fully developed and proved System MASS will be critical elements of the Army's network-centric warfare program and will link infantry level troops on the battlefield to the command headquarters.System MASS will be able to

receive and transmit data, such as geographical information and sensor data including atmospheric conditions, health status and messages allowing the soldiers to access the real time information simultaneously with the command headquarters.

V.Abilash and J. Paul Chandra Kumar designed aArduino Controlled Landmine Detection Robot, This paper has described overall design for wheeled robot for land mine detection purpose and implementation. The wheeled robot is less expensive, robust and it is a helpful tool in for military for surveying and monitoring purpose. The major drawback of the proposed robot was to track the real time location of the robot. Various prototypes of landmine detection robot were reported by researchers.

Anand Nayyar, Ranbir Singh Batth, Amandeep Nagpal designedanInternet of Robotic Things: Driving Intelligent Robotics Of Future- Concept, Architecture, Application And Technologies, This paper is a study of IoT applications in Robotics. With the combination of Robotics, Internet of Things, Machine Learning and Artificial Intelligence, will result in performing complex tasks, in almost an autonomous fashion without any sort of intervention from human beings. With IoT, multiple robots can be integrated for one single task to perform the task in highly cooperative and coordinated manner. The paper comprehensively reviews IoRT architecture as well as technologies required for developing IoRT systems. Robots envisaged for next generation IoRT.

IV. METHODOLOGY

The proposed system is designed using Arduino UNO controller which is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analoginput/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated developmentenvironment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

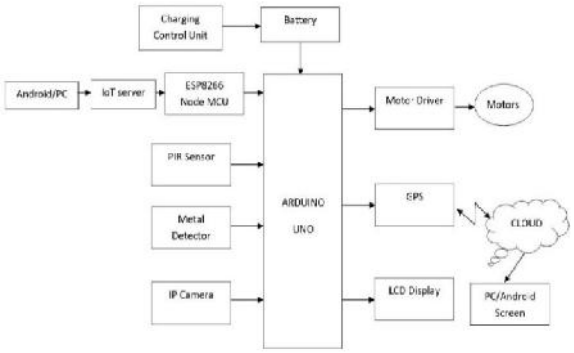

Fig. 1.1 Block Diagram

V. COMPONENTS

ARDUINO UNO: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

Fig. 1.2 Arduino UNO

ESP8266 Node MCU: Node MCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added

Fig. 1.3 Wi-fi Module

PIR SENSOR:PIR sensors allow you to sense motion, almost always used to detect whether a human has movedin or out of

the sensors range. They are small, inexpensive, low-power, easy to use.

Fig. 1.4 PIR Sensor

METAL DETECTOR:A metal detector is an electronic instrument that detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground. They often consist of a handheld unit with a sensor probe which can be swept over the ground or other objects

Fig. 1.5 Metal Detector

IP CAMERA: An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via an IP network. They are commonly used for surveillance but unlike analog closed-circuit television cameras, they require no local recording device

Fig. 1.6 IP Camera

GPS MODULE:GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellite, along with other pieces of data

Fig. 1.7 GPS Module

VI. VERIFICATION AND RESULTS

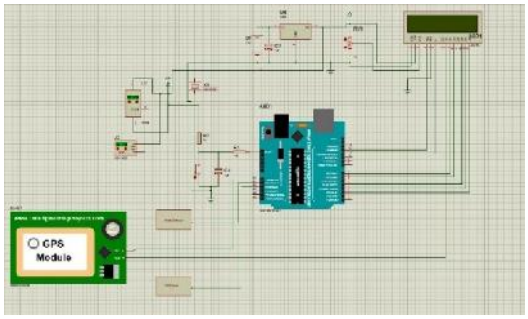

Fig. 1.8 Schematic Diagram

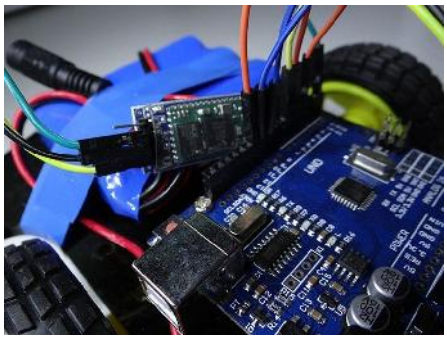

Fig. 1.9 Hardware Model

VII. ADVANTAGES

1. Live streaming is performed
2. IOT based controlling is performed, so it can be controlled from all over the world.
3. Live location of the Robot is tracked by using GPS.
4. Since the robot is live streaming the video, we do not require a memory storage device on the system for the recording.

VIII. CONCLUSION AND FUTURE SCOPES

IoT based Surveillance robot is developed to reduce the risks of the soldiers of our nation. The robot can also serve in areas likeCalamity affected areas like landslides, tsunami,

for the detection of humans from the ruins.By developing a robotic arm, the robot can be used to eliminate enemies and terrorists by using gun in the war field.Also, by using the robotic arm, medicinal supplies can be carried onto the war field safely and securely by the robot.

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